

CLAIMS

1. A magnetorheological fluid comprising:
10 to 14 weight percent of a hydrocarbon-based liquid;
86 to 90 weight percent of bimodal magnetizable particles;
0.05 to 0.5 weight percent fumed silica; and
5 0.5 to 5 weight percent, of the liquid mass, of an additive package including a stearate and a thiophosphate, and wherein the bimodal magnetizable particles consist essentially of:
a first group of particles having a first range of diameter sizes with a first mean diameter having a standard deviation no greater than about
10 two-thirds of the value of said mean diameter and
a second group of particles with a second range of diameter sizes and a second mean diameter having a standard deviation no greater than about two-thirds of said second mean diameter,
such that the major portion of all particle sizes fall within the
15 range of one to 100 microns and the weight ratio of said first group to said second group is in the range of 0.1 to 0.9, and the ratio of said first mean diameter to said second mean diameter is five to ten.
2. A fluid as recited in claim 1 in which said bimodal magnetizable particles comprise at least one of iron, nickel and cobalt.
3. A fluid as recited in claim 1 in which said bimodal magnetizable particles comprise carbonyl iron particles having a mean diameter in the range of one to ten microns.
4. A fluid as set forth in claim 1 wherein the first and second groups of particles are of the same composition.

5. A fluid as set forth in claim 1 wherein the hydrocarbon-based liquid comprises a polyalphaolefin.

6. A fluid as set forth in claim 1 wherein the hydrocarbon-based liquid comprises a homopolymer of 1-decene which is hydrogenated.

7. A fluid as set forth in claim 1 wherein the stearate comprises a lithium stearate.

8. A fluid as set forth in claim 7 wherein the lithium stearate comprises lithium 12-hydroxy stearate.

9. A fluid as set forth in claim 1 wherein the thiophosphate comprises zinc dialkyl dithiophosphate.

10. A magnetorheological fluid comprising:

10 to 14 weight percent of a liquid phase comprising a polyalphaolefin;

86 to 90 weight percent of magnetizable particles;

5 0.05 to 0.5 weight percent fumed silica; and

0.5 to 5 weight percent, of the liquid mass, of an additive package including a stearate and a thiophosphate, and wherein the particles comprise carbonyl iron and consist essentially of:

10 a first group of particles having a first range of diameter sizes with a first mean diameter having a standard deviation no greater than about two-thirds of the value of said mean diameter and

a second group of particles with a second range of diameter sizes and a second mean diameter having a standard deviation no greater than about two-thirds of said second mean diameter,

- 15 such that the major portion of all particle sizes fall within the range of one to 100 microns and the weight ratio of said first group to said second group is in the range of 0.1 to 0.9, and the ratio of said first mean diameter to said second mean diameter is five to ten.

11. A fluid as set forth in claim 10 wherein the stearate comprises a lithium stearate.

12. A fluid as set forth in claim 11 wherein the lithium stearate comprises lithium 12-hydroxy stearate.

13. A fluid as set forth in claim 10 wherein the thiophosphate comprises zinc dialkyl dithiophosphate.

14. A fluid as set forth in claim 10 wherein the magnetizable particles comprise one or more selected from the group consisting of iron-, nickel- and cobalt-based materials.

15. A fluid as set forth in claim 10 wherein the molecular weight of the polyalphaolefin ranges from about 280 to about 300.

16. A magnetorheological fluid comprising:

5 to 25 weight percent of a first liquid;

75 to 95 weight percent of bimodal magnetizable particles; and

0.5 to 5 weight percent, of the liquid mass, of an additive package

- 5 including a stearate and a thiophosphate, and wherein the bimodal magnetizable particles consist essentially of:

 a first group of particles having a first range of diameter sizes with a first mean diameter having a standard deviation no greater than about two-thirds of the value of said mean diameter and

10 a second group of particles with a second range of diameter
 sizes and a second mean diameter having a standard deviation no greater than
 about two-thirds of said second mean diameter,

 such that the major portion of all particle sizes fall within the
 range of one to 100 microns and the weight ratio of said first group to said
15 second group is in the range of 0.1 to 0.9, and the ratio of said first mean
 diameter to said second mean diameter is five to ten.

 17. A fluid as set forth in claim 16 wherein the stearate
 comprises a lithium stearate.

 18. A fluid as set forth in claim 17 wherein the lithium stearate
 comprises lithium 12-hydroxy stearate.

 19. A fluid as set forth in claim 16 wherein the thiophosphate
 comprises zinc dialkyl dithiophosphate.

 20. A fluid as set forth in claim 16 wherein the thiophosphate
 comprises zinc dibutylphosphorodithioate.

 21. A fluid as set forth in claim 1 wherein the thiophosphate
 comprises zinc dibutylphosphorodithioate.

 22. A fluid as set forth in claim 15 wherein the thiophosphate
 comprises zinc dibutylphosphorodithioate.